35 Gb/s Ultra-wideband Technology for Advanced Communications

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Abstract– The fast development of electronics and portable devices, intended mainly for multimedia applications, is increasing exponentially the data traffic demands per user. To cope with these new data demands in limited bandwidth systems, new technologies must be explored and new transmission schemes must be applied, evolving from classic spectral inefficient pulse-based systems to more advanced and flexible modulation schemes.

Ultra-wideband technology is suitable for low-power high-speed wireless communication systems over short distances, and is an appealing alternative for next generation networks ranging from high-speed wireless personal area networks, to the internet of things applications. Its popularity stems from the fact that they can be used as an overlay to existing systems, without interference, operating in parallel to existing wireless systems, which perceive ultra-wideband emissions as ordinary noise. Furthermore, this technology allows unlicensed operation, provided standards and regulations are fulfilled.

On the other hand, in current fast evolving scenarios, secure communications at the physical layer will soon become a requirement by the end users. Existing security techniques involve cryptography and other higher layer methods to secure the transmitted data, however, these are not capable to resolve entirely the psychological need for trust, especially in access scenarios where the user may be located in public spaces. We propose to use Ultra-Wideband communications technology, which can be seamlessly transported over fiber or wireless, and can provide high bit rates ranging from 2 Gb/s to 35 Gb/s. These record bit rates are achieved by means of the multi-band approach of Carrierless Amplitude Phase modulation scheme, which offers high flexibility and enables to mitigate a wide range of channel impairments and comply different regulations worldwide.

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